

Remarks

Claims 1-31 are pending in this application. Reconsideration of the rejections is requested in view of the following remarks.

Rejection of Claims 1-4, 6-13, 17-19 and 24-27 under 35 U.S.C. §102(b)

Claims 1-4, 6-13, 17-19 and 24-27 were rejected under 35 U.S.C. 102(b) as being anticipated by International Application No. WO 00/24837 A1 (Schipper et al. to Akzo Nobel, N.V.). The Final Rejection cited passages in corresponding U.S. Patent No. 6,579,931 B1 to Schipper et al., and averred *inter alia* that:

“Carbonyl functionality may be introduced into the polyurethane during the prepolymer formation or the chain extending step and the references states that polycarbonyl compounds can be used to do so, including acetonyl acetone which would yield a compound having an diacetone functional group (col. 7, 18-25).”

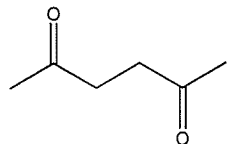
Applicants respectfully disagree. Applicants will mention first that their rejected claims 1-4, 6-13, 17-19 and 24-27 recite a polyurethane dispersion “having a second **crosslinkable functional end group** comprising an **acetoacetoxyl or diacetone group or combination thereof**” (emphasis added). Schipper et al. do not show or describe formation of such end groups. Schipper et al. describe the introduction of carbonyl functionality into their polyurethanes at col. 6, lines 7-27, and say that doing so introduces carbonyl functionality into the “polyurethane backbone”, see col. 6, lines 7-9. Introducing carbonyl functionality into a “backbone” would not necessarily provide an “end group”, let alone a “crosslinkable functional end group” or one comprising an “acetoacetoxyl or diacetone group or combination thereof”.

The cited Schipper et al. passage at col. 7, lines 18-25 discusses compounds, not end groups, and says that:

““The polyurethane/acrylate hybrid dispersions may also incorporate polycarbonyl compound(s). Examples of suitable polycarbonyl compounds are di- or poly-ketones, di- or poly-aldehydes, and aidehyde-ketones such as glyoxal, 2,5-hexanedione,

glutaric dialdehyde, succinic dialdehyde, acetyl acetone, acetonyl acetone, and acetone dicarboxylic acid ester.” (see col. 7, lines 18-25).

Acetonyl acetone (also known as hexane-2,5-dione) has the structure shown below:



No showing has been made that acetonyl acetone would react with or react into Schipper et al.'s polyurethane dispersions, and applicants believe that it would not do so. Schipper et al.'s cited col. 7 passage appears instead to say that Schipper et al.'s dispersions may contain acetonyl acetone as a further ingredient (e.g., as a solvent), not as an end group precursor. Even if acetonyl acetone were to be reacted with or reacted into Schipper et al.'s polyurethane dispersions, no showing has been made that doing so would provide a crosslinkable diacetone functional end group, as presumably one or both of the carbonyl groups would have to be consumed to carry out the proposed reaction.

Schipper et al. do not show or describe formation of polyurethane dispersions containing applicants' recited crosslinkable functional end groups. Applicants accordingly request withdrawal of the 35 U.S.C. §102(b) rejection of claims 1-4, 6-13, 17-19 and 24-27 as being anticipated by Schipper et al.

Rejection of Claim 5 under 35 U.S.C. §103

Claim 5 was rejected under 35 U.S.C. §103(a) as being unpatentable over Schipper et al. on grounds set out at page 4 of the Final Rejection. Claim 5 depends from claim 1 and recites inter alia that the “the second crosslinkable functional end group comprises a diacetone group”. For reasons like those discussed above in connection with the 35 U.S.C. §102 rejection of claim 1, Schipper et al. do not show formation of a polyurethane dispersion containing a “crosslinkable functional end group” comprising a diacetone group, and no showing has been made of anything in Schipper et al. that would suggest forming a polyurethane dispersion with such an end group. Applicants accordingly request withdrawal of the 35 U.S.C. §103(a) rejection of claim 5 as being unpatentable over Schipper et al.

Rejection of Claims 14-16, 20-23 and 29-31 under 35 U.S.C. §103

Claims 14-16, 20-23 and 29-31 were rejected under 35 U.S.C. §103(a) as being unpatentable over Schipper et al. as applied to claims 1-13, 17-19, and 24-27 above, and further in view of U.S. Patent No. 6,063,861 (Irle et al.), on grounds set out at pages 4-5 of the Final Rejection. Applicants agree that Schipper et al. do not “disclose the use of a crosslinking agent in the composition”, but do not agree that the proposed combination of Schipper et al. with Irle et al. would provide the inventions of applicants’ rejected claims 14-16, 20-23 or 29-31. Irle et al. describe polyurethane-polyacrylate hybrid dispersions said to contain acid functional groups and acetoacetoxy functional groups (see e.g., col. 5, lines 58-60). Irle et al. also say that:

*“The acetoacetoxy groups incorporated are incorporated **exclusively** into the polyacrylate portion, while the acid groups are preferably incorporated into the polyurethane portion.”* (col. 5, lines 60-63).

Irle et al. crosslink the acetoacetoxy groups using a difunctional primary or secondary amine (see e.g., col. 2, lines 39-41 and 56-59, as well as col. 5, line 64 through col. 6, line 25), but do not disclose using such amines to crosslink the polyacrylate portion. Irle et al. also say they can use polyamines for polyurethane chain extension (see e.g., col. 4, lines 43-46) or for prepolymer neutralization (see e.g., col. 6, lines 8-14), but teach away from crosslinking their polyacrylate portion (see e.g., col. 2, lines 59-63) and do not describe employing a crosslinker (*viz.*, a crosslinking agent) to crosslink the polyacrylate portion.

Specifically, regarding applicants’ rejected claims 14-16 and 29, none of Schipper et al., Irle et al. or any proper combination of Schipper et al. and Irle et al. discloses or suggests a composition containing a crosslinker and in which “the first crosslinkable functional group of the vinyl addition latex polymer and the second crosslinkable functional end group of the polyurethane dispersion self-crosslink via **polymer-to-crosslinker reaction of the vinyl addition polymer with the crosslinker** and polymer-to-crosslinker reaction of the polyurethane dispersion with the crosslinker at low temperature upon coalescence” (emphasis added). Schipper et al. lack at least the recited crosslinker (as acknowledged in the Final Rejection), and Irle et al. lack at least the feature shown above in boldface.

Regarding applicants’ rejected claim 20, none of Schipper et al., Irle et al. or any

proper combination of Schipper et al. and Irle et al. discloses or suggests a composition comprising a “vinyl addition latex polymer having a first crosslinkable functional group, wherein the vinyl addition latex polymer has an acid number of between about 10 to 60”, a “polyurethane dispersion having a second crosslinkable functional end group” and a “crosslinker”, wherein “the first crosslinkable functional group of the vinyl addition latex polymer and the second crosslinkable functional end group of the polyurethane dispersion self-crosslink at low temperature upon coalescence”. Schipper et al. lack at least the recited crosslinker, and Irle et al. lack at least the recited vinyl addition latex polymer (see e.g., col. 5, lines 3-6 of Irle et al. and the comments at pages 13-14 of applicants’ February 22, 2010 Amendment).

Regarding applicants’ rejected claims 21-23, none of Schipper et al., Irle et al. or any proper combination of Schipper et al. and Irle et al. discloses or suggests a composition containing a crosslinker and in which **“the coating composition is crosslinkable via polymer-to-crosslinker reaction of the vinyl addition polymer with the crosslinker and polymer-to-crosslinker reaction of the polyurethane dispersion with the crosslinker at low temperature upon coalescence”** (emphasis added). Schipper et al. lack at least the recited crosslinker, and Irle et al. lack at least the feature shown above in boldface.

Regarding applicants’ rejected claims 30 and 31, none of Schipper et al., Irle et al. or any proper combination of Schipper et al. and Irle et al. discloses or suggests a composition containing “a polyurethane dispersion having a second crosslinkable functional end group comprising an acetoacetoxyl or diacetone group” and a crosslinker. Schipper et al. lack at least the recited crosslinker. Irle et al. disclose acetoacetoxyl groups but not diacetone groups. Irle et al. also require that their acetoacetoxyl groups “are incorporated exclusively into the polyacrylate portion” and thus teach directly away from the polyurethane dispersions recited in applicants’ rejected claims 30 and 31.

The Final Rejection also avers that:

“It would have been obvious to have added a polyamine crosslinking component to the composition disclosed by Schipper to further crosslink the invented composition so as to yield a product having higher crosslink density which will produce a coating having improved strength and toughness.” (see the Final Rejection at page 5).

This proposed alteration is however contravened by Irle et al. who say that at col. 2, lines 59-63 that:

“To retain the high quality properties of the polyurethane which result from the segmented build-up of this polymer even after grafting of the polyacrylate and the crosslinking reaction, it is advantageous to crosslink or graft the polyurethane part chemically to only a minor amount.”

Irle et al. thus teach away from further crosslinking the polyurethane portion of their dispersion. If asked to consider the matter, a person having ordinary skill in the art who reviewed Schipper et al. and Irle et al. would conclude that addition of a polyamine crosslinking component to Shipper et al.’s compositions would be disadvantageous, because doing so would according to Irle et al. not retain high quality polyurethane properties.

Applicants accordingly request withdrawal of the 35 U.S.C. §103(a) rejection of claims 14-16, 20-23 and 29-31 as being unpatentable over Schipper et al. as applied to claims 1-13, 17-19 and 24-27 above, and further in view of Irle et al.

Rejection of Claim 28 under 35 U.S.C. §103

Claim 28 was rejected under 35 U.S.C. §103(a) as being unpatentable over Schipper et al. and Irle et al. as applied to claims 14-16, 20-23 and 29-31 above, and further in view of U.S. Patent No. 4,764,553 (Mosbach et al.), on grounds set out at pages 6-7 of the Final Rejection. Applicants agree that “the composition invented by Mosbach is not a polyurethane/polyacrylate hybrid dispersion”, but do not agree with the Final Rejection’s averment that:

“Mosbach teaches that diamines and hydrazides are functional equivalents for the purpose of crosslinking polyurethane polymer compositions.”

No such teaching is present in Mosbach et al. Diamines and hydrazides are “difunctional in isocyanate addition reactions”. Mosbach et al. say that such compounds are “chain lengthening agents”, and further say that crosslinking agents are “compounds which are **at least trifunctional** in isocyanate polyaddition reactions” (see col. 5, lines 13-20, emphasis added). Mosbach et al. do not recommend using diamines and hydrazides for the purpose of crosslinking polyurethane polymer compositions.

None of Schipper et al., Irle et al. or Mosbach et al. have been shown to disclose or suggest compositions containing a dihydrazide crosslinker in which a first crosslinkable functional group of a vinyl addition latex polymer and a second crosslinkable functional end group of a polyurethane dispersion "self-crosslink via polymer-to-crosslinker reaction of the vinyl addition polymer with the crosslinker and polymer-to-crosslinker reaction of the polyurethane dispersion with the crosslinker at low temperature upon coalescence". If Mosbach et al. were to be relied on as proposed in the Final Rejection, the result at best would be to use a dihydrazide for polyurethane chain extension and not for the recited polymer to crosslinker self-crosslinking reactions recited in applicants' rejected claim 28.


Applicants accordingly request withdrawal of the 35 U.S.C. §103(a) rejection of claim 28 as being unpatentable over Schipper et al. and Irle et al. as applied to claims 14-16, 20-23 and 29-31 above, and further in view of Mosbach et al.

Conclusion

Applicants have made an earnest effort to address each of the rejections. Withdrawal of the rejections and allowance of applicants' claims are requested. The Examiner is also requested to call the undersigned attorney if there are any questions regarding the application or this response.

Respectfully submitted on behalf of
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